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THE EYE IN RELATION TO GENERAL MEDICINE

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The eye, in many general diseases, gives important indications. Its tissues are highly specialized and susceptible to irritants, and the extent and progress of the general condition can often be judged from the local appearance. Many functional conditions give irritative symptoms, the most important of which are eye-aches or headaches.

The subject of headaches caused by eye irritation is one which has received a great deal of attention in the literature. All sorts of attempts have been made at classification with, on the whole, rather confusing results. A recent paper by de Schweinitz (*Journal of the Medical Association of Georgia,* vol. xviii, No. 2, February, 1929) is notable and one that I cannot too highly recommend. On the present occasion I shall try to give a few practical ideas as to what types of eye disturbances cause headaches, so that, reasoning from the other end of the proposition, a certain type of headache may lead one to suspect eye trouble.

Eye headaches come most commonly from hyperopia, with or without astigmatism, although mixed astigmatism is a potent cause but occurs less commonly. Myopic astigmatism may also give headaches; while simple myopia, as a rule, does not. The increased effort that the ciliary

muscle makes in attempting to focus the astigmatic eye, and particularly the *unnatural* effort, leads to stiffness of the ciliary muscle and finally to cramp. This cramp, or the astigmatism causing it, leads to blurring of vision, in material degrees of error, while in lower degrees the muscle may strain over the error, so that the vision remains normal, while the muscle itself is cramped and sore. The first reaction is in the ciliary muscle, and the eyes themselves ache, while later on the irritation is reflected and becomes a frontal headache, an occipital headache, or even a more distant reflex. Time, therefore, is a very important element in the case, and in children of five or six years old that have not begun to co-ordinate, it is very unusual to see a well marked headache, while muscular ache in the eyes is the rule in older astigmatic cases. If the child goes on straining to an older period, say eight or nine, headaches become increasingly common. Naturally, they are made worse by reading or any use of the eyes at the near point, and are apt to occur late in the day and not early in the morning after the night's rest. If the strain goes on getting worse the cramp may become so chronic that headaches most of the time may supervene; but at the present time this is not often allowed to occur.

A rather useful test is the application of hot fomentations to the eyes. If the headache is from eye-strain and is just beginning, the heat is very apt to relieve it. The severity of the headache is due partly to the amount of the error and the time the eye-strain has gone on, and also to the degree of stability of the individual's nervous system. A robust phlegmatic child will be more apt to have an eye-ache for a time, while a nervous unstable child may have relatively few symptoms of eye-strain but plunge rapidly into the more general reflex of headache.

Disturbance of the muscle balance between the two eyes can also give headaches. Exophoria or convergence weakness is a frequent cause and often occurs where the vision is normal. Vertical disturbance or hyperphoria,

while not a very common occurrence in a number of individuals, is nevertheless a very important source of irritation when it does occur. The effort of pulling one eye down, or the other eye up, it may be, is an entirely abnormal one and is very apt to cause dizziness or vertigo. In fact, while this symptom may rarely come from astigmatism, it is most apt to come from hyperphoria and is readily corrected by the wearing of a proper prism or by a muscle operation designed to bring the eyes on the same line.

Dizziness may also occur in cases of external muscle paralysis of the third, fourth, or sixth nerves. These cases are always accompanied by double vision and are really due to a toxic inflammation of the nerve. A large proportion of the third nerve cases are luetic in origin; the eye is turned down and out, the pupil is dilated, and the upper lid droops. The fourth and especially the sixth nerve paralysis may come from a great variety of causes—sleeping sickness, suppurative middle-ear disease, tooth abscess, cerebral neoplasm, diabetes, etc. Treatment of the underlying condition often clears up the paralysis perfectly.

Conjunctival inflammations fall into two broad classes, infections, and inflammations due to chemical disturbances in the blood. Infections are always characterized by pus formation; the more severe infections have profuse discharge of thick creamy pus, the milder ones have less; but it is perhaps not too sweeping an assertion to state that every true infection has some amount of pus discharge.

On the other hand, a great many persons have reflex congestion of the conjunctiva from eye-strain, or smarting and congestion where no eye-strain exists but where chemical faults occur. In such cases, the normal use of the eyes makes them smart. The mucous membrane of the lids is red and hypertrophic and at times has a scanty discharge. The commonest example of this is in the full-blooded high living individual, who shows a general dilation of the

capillaries of the face. Such cases always have to have astringents applied to the lids in order to relieve the hypertrophy, but a satisfactory result can seldom be attained by local means alone. The chemical examination of the blood will usually show some disturbance—as high urea or high uric acid—and until the digestive condition is corrected a certain tendency to recurrence is often shown.

Sub-conjunctival hemorrhage is a common condition and is often ignored. It is frequently, however, a symptom of circulatory irritability and should always be considered. It may be due to high blood pressure with arteriosclerosis or, on the other hand, may be due to only a temporary rise of pressure in an otherwise healthy person. Frequently the blood pressure is not taken until some hours after the attack and no elevation is found. It is therefore assumed that the hemorrhage is purely an accident. This is often not the fact. A certain amount of fatigue and irritability can often be assumed and—unless an unusual strain, like an attack of coughing in whooping cough is known to have occurred—such patients will bear watching and regulation.

Corneal disease, except for a few special forms, always means depression or even malnutrition. On account of the peculiar lymph circulation, ulceration occurs very readily in those who are below par. Regulation of the digestion and tonic treatment are almost always indicated. In certain types of corneal ulcerations in elderly people, alcohol is almost an essential; it is best administered in the form of milk punch; its rapidity of action gives it a place occupied by no other drug; iron and strychnine, which have a certain value, both are too slow in their effects. Of course local treatment of the ulcer is highly important.

Iritis and cyclitis, inflammation of the iris and ciliary body, are invariably due to a constitutional toxin; the tissue is spongy, sensitive, and reactive—and the vascular reaction to a toxin is very severe. The resulting symptoms of redness, pain, plastic deposit, while subject to a

great amount of variation, may be quite severe and by the degree of their severity indicate the amount of intoxication. Twenty-five years ago it was considered that a large proportion of both these diseases were syphilitic in origin, and this is probably true. Many writers gave the proportion about as follows:

Syphilis, 75 per cent.
Rheumatism, 23 per cent.
Tuberculosis and other rarer forms, 2 per cent.

We saw two special types of specific iritis: that appearing in the secondary stage, which was simply a severe plastic form; and that occurring in the later stages, which was characterized by a reddish mass on the pupillary margin, which was variously assumed to be a condyloma or a gumma. No doubt these forms still exist in certain localities, but the advent of the Wassermann test and the intravenous treatment with salvarsan have made both forms almost a rarity in our practice here. The early and positive diagnosis of syphilis, followed by efficient treatment has given a totally different complexion to the question of its clinical importance. On the other hand, it has been repeatedly pointed out, especially by English and American writers, that the word rheumatism was merely a convenient scrap-basket for a great variety of toxic conditions, and that the only true rheumatic iritis was the form that occurred during an attack of acute rheumatism, which is rather rare. This is undoubtedly correct, and iritis and cyclitis, in combination as they frequently are, or separately, are to-day most often caused by focal or digestive infections. There are a few rare forms, such as tubercular or leprous iritis, where the germ occurs in the tissue itself; but in the vast majority of cases seen in this locality search for a cause resolves itself into a blood test and then a search for local infections.

I designedly pass over those forms which occur in meningitis and other infectious diseases where the cause is obvious. Undoubtedly a simple digestive sepsis can give an

inflammation of this type. It usually occurs in those who are much depressed and perhaps anemic, and tests of the urine, chemistry of the blood and perhaps also of the feces will furnish definite indications. It is most apt to be bilateral, as one would expect, and may be accompanied by low grade arthritis of the small joints or other evidences of a general chemical disorder. However, when a patient in apparently good health suddenly develops an iritis or irido-cyclitis in one eye, and the general tests—kidney, blood, intestines—show nothing abnormal, the search for a cause usually centers in the infections that occur in the head. There are a few rare infections that may occur in other parts of the body—prostate, appendix, genital tract, as from chronic gonorrheal infections, etc.—but these are rarely met with and it is only necessary to investigate to find the cause.

Head infections, however, are frequently latent, yet they form a large proportion of the cases. There is no question that a tooth abscess may cause an iritis, but that it often does so is very doubtful. The pus occurs in very small quantity in an apical abscess and is often confined in a rigid bony space where absorption must be very difficult. It is conceivable that under certain circumstances absorption from pyorrhea may occur in sufficient amount to lead to an infection of the iris, but under ordinary circumstances the pus drains away and no infection occurs. I do not wish to give the impression that examination of the teeth is not important; where other infections exist, there is always a question as to whether or not a diseased tooth may be adding to the sensitization of the patient, and where the question is of sufficient importance a diseased tooth should be extracted. As a sole and primary cause of iritis, however, it does seem that the rôle of the teeth has been somewhat "over-played." Too often the extraction of a diseased tooth has no effect whatever on the process.

The tonsillar question is a very different story. It is well known that the tonsils harbor infection very readily and that when they are once infected they seldom free

themselves from the infection. Constitutional effects from tonsillar infection are too well known to receive more than passing mention. It follows then that iritis from tonsillar infection is a most reasonable thing to expect, and as a matter of fact it does occur quite frequently. The difficult question to decide is when the tonsils are infected and how much they participate in the process as compared with the upper nasal air chambers, or the sinuses. It is, I think, quite generally agreed that the presence of bacteria on the tonsil means little, except that some strains of bacteria are undoubtedly more deserving of being objects of suspicion than are others. Enlargement of the tonsils and a history of tonsillar attacks, particularly abscess, are significant; and the ability of the tonsil to exude pus on pressure is perhaps the most significant symptom of all.

Iritis and cyclitis may be caused by a purulent antrum —a condition which must be considered a focal infection. Purulent disease of the ethmoids and sphenoid can also act as a cause, and do so chiefly when pus develops in a confined cell. In both of these cases a rhinological examination will most probably show pus coming from the affected spot.

There is, however, another type of sinus disease which we must now consider. Where the case is frankly a purulent one, the mucous membrane is apt to thicken so as to interpose a wall of resistance to further infection. In certain cases the infection seems to extend beneath the mucous membrane, and the chief changes are in the bone. We have then a low-grade osteitis which is capable of causing iritis, cyclitis, choroiditis, retinitis, or neuritis. There are few definite symptoms in these cases and x-ray findings are of little help. Still, when a sinus operation is done the eye condition at once clears up, showing conclusively that the eye infection came from the sinuses. The diagnosis is the difficult part and must rest upon the type of the eye inflammation and the absence of other causal findings. This is a matter of close co-operation between the ophthalmologist and the rhinologist. Whether the tonsils or the sinuses

become infected first and which infects the others, are difficult questions. According to most of the opinions in my own circles, the tonsils are the first infected, though the more one studies head infections the more one is impressed with the feeling that they are much more general than local. At the same time, they frequently center at one spot and operation on this spot enables the patient to master the rest of the process himself. For instance, we frequently see badly infected tonsils in the presence of a low-grade ethmoiditis, and after the tonsils are removed the ethmoiditis subsides. What should be done surgically is often a very important decision and one which rests chiefly with the rhinologist. The surgeons whose judgment is most to be valued, I think, are inclined to take out all manifestly diseased tissues and to make as clean a sweep of the infected material as possibly. In many instances this stops the infection and the patient has no further trouble. It must always be remembered, however, that the operation does not always secure bacterial immunity, and, after the tonsils are removed and the sinuses exenterated, reinfection can occur and immunity must be secured by other measures—vaccines, general treatment, change of climate, etc.

What has been said concerning the iris applies, to a large extent, to the similar tissue, the choroid. Before the Wassermann test and the salvarsan treatment, many cases of scattered or disseminated choroiditis were observed that were undoubtedly of specific origin. We do not see so many of these now-a-days and yet we see plenty of cases of choroiditis. The causative factors seem to be digestive or focal infections; the choroid seems rather more susceptible to digestive changes than the iris and ciliary body. Again I pass over infectious diseases, as meningitis, since the causation here is well known.

Aside from the ophthalmological appearance, the most striking symptom of choroiditis is haziness in the eye or floating spots before the vision. These spots are inflammatory and are dense enough to obscure the vision, whereas

the tiny normal floating spots which are known as "muscae" are transparent. The myopic eye is particularly predisposed to choroiditis on account of the fact that the tissue is stretched and its blood and lymph circulation are materially interfered with. It was formerly supposed that the choroiditis of myopia was largely a mechanical affair and was due to tearing of the tissue as the eye elongated. However, it seems much more probable that it is a toxic process in a tissue which has been rendered vulnerable. The search for the toxic cause must be thorough and very exhaustive, as a slight disturbance can cause a marked process in the myopic eye when it would cause much less severe a process in a normal eye.

Choroiditis occurs at times in young children and is due to digestive disturbances—acidosis, etc. Unfortunately, it frequently passes unnoticed, and later a spot of retinochoroidal atrophy develops which, if it be near the macula, will affect vision seriously and permanently. A spot of choroiditis of any degree of severity almost always destroys the overlying retina. Choroiditis can also be caused by infection from the head—tonsils, sinuses, or teeth—as has been mentioned.

A word should perhaps be said concerning glaucoma. This disease occurs chiefly in those beyond fifty years of age but can occur at any age. It varies from the most quiet chronic types with no pain, to the most acute and violent with most intense pain. The more severe the process the more apt is the pain to be located in the eye. There are many chronic cases, however, where the pain may be in the forehead or even reflected to other parts of the head. It always occurs in the same manner, usually at the end of a day's work when a certain amount of fatigue is present.

The retina is a very highly specialized form of nerve tissue and has a rather peculiar list of susceptibilities. Perhaps the most important is the retinitis which accompanies chronic kidney disease. It is always a late symptom and the exudates are distributed in a "star" shaped figure

in the macula. This appearance is always characteristic; and yet, on the other hand, Bright's retinitis may assume other forms—in fact the retinal spots may be scattered on the outlying parts of the fundus and be very small and inconspicuous. Any form of retinitis occurring late, as it does, in chronic nephritis is of very serious prognostic import. It seems to indicate severe toxic saturation, and the patient frequently dies in from three to six months after the onset of the retinitis. Hemorrhages in connection with the retinitis are generally considered to add to the gravity of the prognosis as they indicate vascular disease. I do not wish to make the bad prognosis too sweeping, as I have seen a typical case arrested by careful general treatment, and now—three years after the onset—the patient seems to be holding the kidney process; at least she is not getting worse rapidly and the retinitis has cleared up, with restoration of vision to normal in one eye.

There is also another type of cases in which the typical albuminuric retinitis occurs, and that is the kidney attacks of pregnancy. These attacks come on late and occur in those who have never had any indication of Bright's disease. They go on rapidly to uremia, and if not interfered with promptly may be fatal in their results—or at least very destructive to the retinal tissue. They generally require the induction of labor, after which the retinitis clears up with great promptness and in many instances normal vision is restored. While complete recovery is the rule in those who have previously been free from kidney inflammation, some internists think that deterioration occurs in a fairly large percentage of the Bright's retinitis of pregnancy cases; and that if they can be followed up for several years, recurrent kidney attacks will be found to have occurred.

Retinitis in a rather characteristic form occurs late in diabetes; while it was never considered a serious symptom, as was the retinitis of chronic nephritis, it nevertheless was apt to be followed by a fatal termination of the disease

in from one to two years. Insulin, however, has changed all this. Even cases with a marked retinitis can go on much longer than was formerly the case—how much longer, I cannot with certainty say. They do not succeed in absorbing the exudates and, as a rule, the vision stays below normal.

Retinitis also occurs in focal infections from the tonsils, sinuses, or teeth, as has been mentioned. The ophthalmoscopic diagnosis under these circumstances is a very important one.

Hemorrhage in the retina is a very important condition from both its local and general significance. If it is caused by arteriosclerosis, other signs of vascular degeneration are apt to be present—tortuosity of the vessels, "beading" of the arteries, peri-vasculitis, etc. If these signs are absent, and particularly if the individual is in good health, with normal blood pressure, etc., we may have reason to assume that the hemorrhage was of accidental origin—which usually means a rise of blood pressure from some unusual strain. Hemorrhages occur in the retina also as an accompaniment of a retinitis. The hemorrhage is often the most conspicuous feature, but a careful search should also be made for inflammatory exudates, areas of edema, and other signs of a plastic inflammatory process. The hemorrhages are the natural accompaniment of such a process.

I should like, in this connection, to say a few words on a much vexed question—the use of the ophthalmoscope by the general practitioner. It is undoubtedly important to avail ourselves of all possible means of diagnosis, and if the general practitioner could be well taught in ophthalmoscopy and could have enough experience to analyze what he sees in the fundus of the eye, much information of value could be obtained. The eye-ground is often a very good barometer as to the condition of the circulation and nervous system, and certain toxic and digestive changes at times give very important indications. However, ophthal-

moscopy is not to be learned in a day, and a vast amount of clinical experience is necessary to make one's opinion worth anything at all. There is a tremendous variation in the normal, and an infinite variety in the abnormal. Every ophthalmologist constantly sees absurd mistakes made by those who have only a little knowledge of the subject, and I would urge those who wish to use the instrument to advantage, to approach the subject with due reverence and to back up their opinion by large clinical observation.

The optic nerve in the main is sensitive to the same type of toxins as is the retina. Optic neuritis may be caused by syphilis, acute infectious diseases—of which meningitis is the most common—certain digestive toxemias, focal infections from the sinuses or tonsils, etc. The form of neuritis from disease of the sphenoidal sinus is perhaps at times due to a direct extension of the process through the bone into the nerve. Practically all forms are exceedingly dangerous to vision. The optic nerve is a highly specialized and delicate tissue, and if the inflammation be not relieved quickly, tissue destruction going on to serious damage to vision, if not to actual blindness, is the result.

One special form of neuritis deserves particular mention—the so-called alcohol and tobacco amblyopia. This is really an inflammation of the papillo-macular bundle of the optic nerve, the most highly specialized part and therefore the most vulnerable. This was demonstrated by de Schweinitz from autopsy specimens some years ago. It usually occurs from alcohol and tobacco in combination, and seems to depend on digestive or fermentative disturbances caused by the ingestion of large quantities of both articles. There is an impression among the laity that if whiskey or other alcoholic drink that is free from impurities is taken, no bad effects are to be apprehended; but it is certain that the disease has been caused by absolutely pure products. Poisoning by methyl alcohol, etc., does not cause this type of disturbance. It can also occur with tobacco or alcohol alone. For some years it was

doubted that tobacco alone could cause a neuritis, but a number of cases have been reported where it seemed fairly certain that alcohol had not been taken. It usually occurs in cigarette smokers who inhale and who have a cigarette in the mouth during most of their working hours. The tobacco cases are less stubborn than the alcohol ones, but are sufficiently dangerous to vision and will go on to absolute blindness unless relieved. The attack is usually quite rapid in its onset. The patient wakes up in the morning with a dense whitish blur in the line of direct vision and a total loss of color perception when an object is looked at directly, though the outer parts of the field may still perceive some colors. Ophthalmoscopic examination shows only slight appearances of neuritis, or perhaps none at all at first. In other cases, the failure of vision may come on more slowly, but this is rather exceptional and depends on the ability of the patient to burn up the alcohol. Chronic habitual alcoholics are a little more apt to have a slow onset. The prognosis is relatively favorable, but of course all alcohol and tobacco must be withdrawn, and the intestinal tract must be energetically treated by diet, irrigations, cathartics, etc. Strychnine in doses up to the limit of toleration is also valuable. A rather curious impression has occasionally been brought forward: that those who have recovered from an attack are more or less immune. While it is certain that in some cases smoking and drinking have been resumed without damage to vision, it is most probable that they have been resumed in much smaller quantities; also there are plenty of instances where drinking has been resumed in large quantities and where the patient has gone blind through recurrent attacks. It is very doubtful if any real immunity exists, and in any event it seems wiser not to test this point.

Methyl alcohol has been mentioned. This, however, does not cause a definite neuritis, but quite a different process. The patient who has taken enough methyl alcohol becomes rapidly unconscious and the optic nerves become pale, with contracted vessels, and most commonly go on to total

atrophy and complete blindness. The same thing happens in poisoning from a large dose of quinine. What usually happens is that one or two teaspoonfuls is taken by mistake for a dose of salts. The patient becomes unconscious, and when he recovers the optic nerves are white, with small vessels and the patient is blind. He rarely recovers, though vigorous eliminative treatment, followed by full doses of strychnine are usually given. All sorts of attempts to secure dilation of the central vessels have been made, but they seem to have little effect.

Choked disc or papilledema is a process in the optic nerve that requires special mention. It is often confused with neuritis by the use of names like "papillitis," which should be applied only to a plastic or inflammatory process. Essentially, it is a choking of the lymphatics by some disturbance in the base of the brain near the ventricles, which dams up the fluid in the optic nerve and causes also a distention of the subdural and subarachnoid spaces in the sheath of the nerve just back of the eyeball. There are no plastic exudates and no depression of vision until the process has lasted for some weeks. It is invariably caused by increased intracranial pressure with obstruction to the basal lymph circulation. As increased intracranial pressure is almost always caused by a neoplasm, so it follows that choked disc usually means brain tumor with obstruction of the basal circulation. Thus a tumor of the cortex does not cause choked disc until the process extends so as to involve the base. The diagnosis with the ophthalmoscope is therefore very important. It is not difficult in the typical early cases; whereas later the picture may be very confusing. I was fortunate enough once to see a case the day before the onset of the edema when the nerve was normal, and the very day of the development of the edema—the day following, when the nerve looked as if a drop of water had been injected into it with a hypodermic needle. The next day it thickened and became slightly opaque; and soon it became swollen with tortuous and distended vessels. The vision did not decrease for a month, however. This case

was explored and found to have an inoperable glioma, as is too often the case. The diagnosis rests on the normal vision, markedly swollen nerve, with tortuous vessels and perhaps hemorrhages and the absence of plastic exudates in the early stages; whereas in neuritis the nerve is red and hazy, with less marked swelling, perhaps none at all and plastic exudates on its edge and extending over onto the retina. When a neuritis begins, the vision at once falls off rapidly, and if the neuritis be not checked a secondary atrophy of the optic nerve with greater or less damage to vision is the result. Choked disc cases often require a cranial decompression which relieves the optic nerves but has little effect on the underlying tumor.

All sorts of curious functional changes take place in the eye as the result of instability of the general nervous system. These changes vary from the simple muscular irritability of those who can never tolerate any change in coordination and who have muscular aches and even cramps whenever a change is made in their glasses, to the absolute cessation of function seen in an external muscular paralysis or even the condition known as hysterical blindness. Any of the external muscles may be affected, 3rd, 4th, 6th nerves, levator of the lid, or the pupil. A very suggestive condition is that the paralysis is incomplete and does not follow the complete distribution of the nerve. Scotomas or spots in the field of vision occur and are usually not in line with the normal distribution of the fiber bundles. For instance, the upper half of the retina may fail to function; whereas, without retinal disease failure of function due to a cerebral hemorrhage would be a lateral hemianopsia, or in accordance with the normal distribution of the fibers. In fact, inconsistency is one of the most striking signs of a hysterical disturbance. In an eye that is blind and cannot see light from hysteria, if the light be thrown on the pupil it will contract normally. Also, the signs of emotional instability are striking and suggestive. Many such cases who have a very patient, long-suffering aspect, will blaze out into fits of temper if irritated. The so-called globus hys-

tericus may also be found, and the patient will complain of a choking sensation in the throat on the least provocation. Also other hysterical manifestations may be present.

Hysterical cases always are influenced by methods of suggestion but the suggestion must have some basis of reason. In other words, it is not sufficient to tell a hysterically blind person that she can see, but some drops must be used, or glass used which is supposed to influence vision. While such cases may last indefinitely, they usually yield in a short time if the patient's confidence can be gained. Of course, a sharp look-out should always be kept for true organic conditions, for it is quite possible for a hysteric to have an organic lesion. It is bad enough to mistake a hysterical condition for an organic one, but far worse to mistake an organic lesion for hysteria.